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Effects of mindfulness-based cognitive therapy on self-reported suicidal ideation: results from a randomised controlled trial in patients with residual depressive symptoms

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Abstract

Introduction: The aim of the present study was to investigate the effects of mindfulness-based cognitive therapy (MBCT) on suicidal ideation in an open-label randomised controlled trial of patients with residual depressive symptoms. Furthermore, this study aimed at examining whether an effect of MBCT on suicidal ideation was dependent on a reduction in depression severity, worry and rumination, or an increase in mindfulness.

Methods: One hundred and thirty participants were randomised to a treatment arm (treatment as usual plus MBCT) or a wait list arm. Change in depression, change in worry, change in rumination and change in mindfulness were entered as covariates in a repeated measures ANOVA in order to assess to what degree MBCT-induced changes in suicidal ideation were independent from changes in these parameters.

Results: There was a significant group \times time (pre vs. post) interaction on suicidal ideation indicating a significant reduction of suicidal ideation in the MBCT group, but not in the control group. The interaction remained significant after addition of the above covariates. Change in worry was the only covariate associated with change in suicidal ideation, causing a moderate reduction in the interaction effect size.

Conclusions: The results suggest that MBCT may affect suicidal ideation in patients with residual depressive symptoms and that this effect may be mediated, in part, by participants' enhanced capacity to distance themselves from worrying thoughts.

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1. Introduction

Suicidal ideation has been shown to be a major risk factor for suicidal behaviour and is associated with depression. Several population-based studies revealed point prevalences of suicidal ideation in the general population ranging from

5% up to 10% [1–4]. In clinical samples, the prevalence of suicidal ideation is much higher. In a meta-analysis, the risk for completed suicide in patients who had ever been hospitalised for suicidality was 8.6% and, for hospitalised patients with affective disorders without specification of suicidality, the lifetime risk was 4.0% [5]. Nock et al. noted that half of those who considered ending their lives (suicidal ideation) had a prior mental disorder [6]. Major depressive disorder in particular is an important predictor for suicidal ideation and behaviour [1,7,8].

However, despite being correlated with depression, recent evidence suggests that suicidal ideation may be more than a symptom or mere consequence of an affective disorder. Leboyer and colleagues [9] noted that suicidal thoughts and behaviour might constitute a potentially isolated psychological phenomenon, partially independent from other expressions of psychopathology [10,11]. Diefenbach and

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colleagues [12] interpreted their results in a similar way and stated that suicidal ideation may be associated with non-specific subclinical psychopathological features such as emotional instability, together with anxiety, social inhibition, and possibly hostility and negative affectivity. A number of recent studies on developing or evaluating self-report instruments for the assessment of depression reported that it may be challenging to incorporate suicidality in a unidimensional scale for depression [13–15]. For example, Forkmann and colleagues [15] and Kendel and coworkers [15] found that the suicidal ideation item of the depression module of the Patient Health Questionnaire [16] did not fit a unidimensional Rasch model. Accordingly, Van Orden and colleagues [17] proposed that suicide risk assessment should be included in DSM-5 [18] on a separate sixth axis. Indeed, in DSM-5, the category “suicidal behavior disorder” is part of Section 3.

If suicidal ideation is not merely a component of depression but instead represents a potentially isolated psychological phenomenon, or even a separate nosological entity, the implication is that treatments aimed at reducing depression may not necessarily impact also on suicidal ideation. A recent meta-analysis highlights the fact that there is insufficient evidence for the assumption that suicidal ideation in depressed patients can be reduced with psychotherapy for depression—although this is the recommended type of intervention for depression [19]. The authors stress that the results of their analyses suffer from limited statistical power due to the small number of available trials and suggest that there is a need for additional randomised controlled trials that measure suicidal ideation, suicide risk, and attempted or completed suicides as outcomes.

1.1. Mindfulness-based cognitive therapy

A prominent variant of the so-called third-wave approaches to psychotherapy is mindfulness-based cognitive therapy (MBCT). Mindfulness-based cognitive therapy is a group-based 8-week meditation exercise combined with cognitive behavioural techniques [20]; it aims at focusing on the “here and now” in order to engage with momentary experience and to redirect attention whenever it has switched to distracting thoughts and worries. Moreover, MBCT promotes the cultivation of an open, mild and curious orientation of mind. This refers to experiencing the present moment without judgement or evaluation and without worrying about the future or ruminating about the past [21]. Mindfulness-based cognitive therapy has been proven to significantly reduce relapse risk after remission of a depressive episode [22,23], and also appears effective for acute phase treatment of various severity levels of current depression [24–27]. Geschwind and colleagues [28] found that MBCT was associated with increased levels of momentary positive emotions and greater appreciation of pleasant daily-life activities. Van Aalderen and colleagues [29] showed that the efficacy of MBCT, as compared with

treatment as usual (TAU) in reducing levels of depression, was mediated by decreases in worry and rumination and increases in the mindfulness skill “accepting without judgement”. Recently, Batink and coworkers [30] showed that changes in momentary positive and negative affect significantly mediated the efficacy of MBCT and the effect of changes in worry on depressive symptoms.

Although MBCT originally was developed to prevent depressive relapse, it may be also suitable for patients with suicidal ideation and behaviour [31]. Williams and colleagues [32] propose that MBCT may help prevent recurrence of suicidal crises by targeting cognitive reactivity to sad mood in periods of remission. Cognitive reactivity is assumed to be a process by which small deteriorations in mood may reactivate cognitive patterns that were active in past episodes but hidden in remission [33]. Mindfulness-based cognitive therapy may target cognitive reactivity by enabling people to adopt a different, more decentred relationship with their own thoughts, feelings and body sensations, thus preventing these experiences from launching a downward mood spiral that would otherwise have led to another suicidal crisis [32,34].

However, there is equivocal evidence for the efficacy of MBCT for suicidal ideation and clear conclusions are impeded by a lack of randomised controlled trials. Dialectical behaviour therapy (including mindfulness training) was shown to successfully reduce suicidal behaviour in borderline personality disorder [35]. Barnhofer and colleagues [36] examined the effects of MBCT plus TAU in comparison to TAU alone in a sample of 28 patients suffering from chronic depression with a history of suicidal ideation and behaviour. Results suggested a significant effect of MBCT on depression but not on suicidal ideation [36]. The effect size sensu Cohen [37] for the difference between pre- and post-treatment assessments in the MBCT group was $d = 0.48$. Thus, this effect possibly would have approached significance in a larger sample with sufficient power.

The results of these studies suggest that MBCT may confer positive effects on suicidal ideation and behaviour; however, evidence is equivocal and limited. To the best of our knowledge, no data have been published examining the effect of MBCT on suicidal ideation in a large randomised controlled trial with a sample of patients with residual depressive symptoms after acute depression.

1.2. Aims of the current study

The current study is a secondary analysis of the Mind-Masstricht study [trial number NTR1084; 28]. The primary aim of the present investigation was to examine the effects of MBCT on suicidal ideation in an open-label randomised controlled trial comparing participants with residual depressive symptoms after at least one episode of major depressive disorder who were randomly assigned to a wait list condition, with participants who received MBCT. A second aim was to examine whether an effect of MBCT on suicidal

ideation was dependent on reductions in depression severity, worry, and rumination, or an increase in mindfulness. To pursue these goals, secondary analyses were performed using data acquired in a comprehensive research project conducted at Maastricht University Medical Centre. Details of the central research questions and primary results can be found elsewhere [25,28].

2. Methods

2.1. Sample

In the MindMaastricht study (trial number NTR1084, Netherlands Trial Register Trial registration: <http://www.trialregister.nl/trialreg/admin/rctview.asp?TC=1084>) [28], adults with residual depressive symptomatology (≥ 7 on the 17-item Hamilton Depression Rating Scale (HDRS) [38]), after at least one episode of major depressive disorder (MDD) were recruited from outpatient mental health care facilities in Maastricht and through posters in public spaces. As the focus was on stable residual symptomatology in the context of a previous affective disorder, individuals were excluded if they met SCID criteria for a current depressive episode, schizophrenia, or any psychotic disorder in the past year, and recent (past four weeks) or upcoming changes in ongoing psychological or pharmacological treatment. Sample sociodemographic and clinical characteristics are displayed in Table 1. There were no significant differences between groups ($p < 0.05$) at baseline.

2.2. Sampling procedures

All study procedures were approved by the Medical Ethics Committee of Maastricht University Medical Centre, and all participants signed an informed consent form. Initial screening was performed by phone to check for availability during the study period and the likelihood of meeting in- and exclusion criteria. A second screening included the administration by trained psychologists of the Structured Clinical Interview for DSM IV axis I [39] and the 17-item HDRS.

Table 1
Baseline demographic and clinical characteristics per group.

	MBCT (n = 64)	CONTROL (n = 66)
Age (mean, SD)	44.6 (9.7)	43.2 (9.5)
Female gender	79%	73%
Full-/part-time work	62%	68%
Illness/unemployment benefits	19%	23%
Living with partner/own family	64%	64%
Comorbid anxiety disorder (present)	35%	49%
Comorbid anxiety disorder (past)	51%	64%
Current psycho-counseling/-therapy	13%	12%
Current use of antidepressants	32%	38%
(Occasional) use of benzodiazepines	8%	8%

There were no significant differences between groups (at $p < 0.05$). MBCT = Mindfulness-based cognitive therapy; CONTROL = waitlist control condition.

Eligible participants took part in the baseline assessment, after which they were randomised to either the MBCT or waiting list (allocation ratio 1:1). After either eight weeks of MBCT (see below) or the equivalent waiting time (control group), participants took part in the post-intervention assessment. All participants were compensated with gift vouchers worth 50 euros. Participants in the control group had the opportunity to take part in MBCT after the post-intervention assessment.

2.3. Randomisation

Randomisation to the treatment condition was stratified according to the number of depressive episodes (two or less versus three or more) as, at the time of randomisation, studies suggested a greater benefit for those with three or more previous episodes [40]. An independent researcher not involved in the project generated the randomisation sequence in blocks of five (using the sequence generator on www.random.org), and wrote the randomisation code into sealed numbered envelopes. After completion of all baseline assessments, the researcher allocated participants to their treatment group based on the randomisation code in the sealed envelope (opened in order of sequence). No masking of treatment condition took place.

2.4. Mindfulness-based cognitive therapy

The content of MBCT training sessions followed the protocol of Segal, Williams and Teasdale [20]. Training consisted of eight weekly meetings lasting 2.5 h and were run in groups of 10–15 participants. Sessions included guided meditation, experiential exercises and discussion. In addition to the weekly group sessions, participants received CDs with guided exercises and were assigned daily homework exercises (30 to 60 min daily). Training sessions were given by experienced trainers in a centre specialising in mindfulness training. All trainers were supervised by an experienced health care professional who had trained with Teasdale and Williams, the co-developers of MBCT [41].

2.5. Measures

2.5.1. Kentucky Inventory of Mindfulness Skills

The Dutch version of the Kentucky Inventory of Mindfulness Skills (KIMS) [42] measures the presence of mindful skills in daily life. It is a 36-item self-report instrument designed to measure mindfulness skills. Items are rated on a 5-point Likert-scale ranging from “never or very rarely true” (1) to “always or almost always true” (5). Higher scores indicate the presence of more mindful skills. A total KIMS score can be calculated indicating the extent of overall mindfulness skills. Prior research has reported reasonable correlations of the KIMS with a variety of other clinical constructs [42,43].

2.5.2. Hamilton Depression Rating Scale

The 17-item HDRS [38] was administered by two trained research assistants with master's degrees in psychology. The HDRS is a semistructured interview designed to assess depressive symptoms over the past week. It is one of the most often used rating scales in depression research, and internal, interrater, and retest reliability estimates for the overall HDRS are good [44]. Only the overall score was used for the analyses, and interrater reliability for the total score was high (intraclass correlation coefficient $\alpha = 0.97$). In order to assess interrater reliability, both interviewers had independently rated eight videotaped HDRS interviews with patients varying in the strength of their residual depressive symptoms.

2.5.3. Penn State Worry Questionnaire (PSWQ)

The PSWQ is a 16-item (5-point Likert scale) self-report instrument that measures the concept of worry [45,46]. Internal consistency (Cronbach's alpha) in the present sample was $\alpha = 0.90$.

2.5.4. Rumination on Sadness Scale (RSS)

The Dutch version [47] of the RSS [48] was used to measure rumination. The instrument consists of 13 items that load on one factor. It has good convergent and discriminant validity and internal consistency [48]. In the present sample, internal consistency was $\alpha = 0.90$.

2.5.5. Suicidal ideation

Suicidal ideation was measured using the respective item from the self-rating form of the Dutch version of the Inventory of Depressive Symptoms [49]. This item asks for thoughts about death and suicide in the past seven days. Answers can be given on a 4-point scale ranging from 0 (I do not think of suicide or death) to 3 (I think of suicide or death several times a day in depth, or have made specific plans, or attempted suicide). This item has been used successfully as an indicator for suicidal ideation in some clinical studies [50–52].

2.6. Statistical analysis

First, we examined the effects of MBCT on change in suicidal ideation relative to the control condition by conducting an analysis of variance for repeated measures (ANOVA). Thus, in the models of suicidal ideation, the two-way interaction between study period (baseline vs. post assessment) and treatment group (control vs. MBCT) was the parameter of interest. Change in depression (HDRS without suicide item), change in mindfulness (KIMS total), change in worry (PSWQ), and change in rumination (RSS) subsequently were entered as covariates to examine whether changes in suicidal ideation were independent from changes in these parameters. Change scores were calculated as difference scores between baseline and post assessment. The suicide item was excluded from the HDRS sum scores to avoid overlapping and thus part-whole correlations. We controlled for homogeneity of error variances. This is important in order to interpret validly the results of

MANOVA. In the case of significant results of the Mauchly test, and thus violation of homogeneity of error variances, a Greenhouse–Geisser correction was implemented. When significant interactions occurred, post-hoc pairwise comparisons were calculated to identify the source of the significant interaction effects.

3. Results

3.1. Participants

Recruitment of participants started in January 2008 and ended in February 2009; all post-intervention assessments were completed by August 2009, when the pre-determined number of participants was reached. At baseline, there were no significant differences between groups with respect to socio-demographic and clinical characteristics (Table 1). Table 2 shows the baseline assessment scores of variables used in the analyses, stratified by treatment group. Again, there were no significant differences between groups at baseline. Participant flow through the study has been described in earlier publications (e.g. Geschwind et al., 2011). No harm or unintended treatment effects were reported in either group.

3.2. Effects of MBCT on self-reported suicidality

The interaction between study periods (baseline vs. post assessment) and treatment group (control vs. MBCT) on suicidal ideation was significant ($F = 7.226$; $p = 0.008$; $\eta^2 = 0.054$). This interaction effect is depicted in Fig. 1. Post-hoc tests showed a significant reduction of suicidal ideation in the MBCT-group ($t = 2.73$; $p = 0.008$; $d = 0.42$) but not in the waiting list control-group ($t = 0.83$; $p = 0.41$; $d = -0.08$). Neither change in depression ($F = 0.409$; $p = 0.52$; $\eta^2 = 0.003$), nor change in mindfulness ($F = 0.089$; $p = 0.77$; $\eta^2 = 0.001$), nor in rumination ($F = 0.088$; $p = 0.77$; $\eta^2 = 0.001$) and treatment group ($F = 0.487$; $p = 0.49$; $\eta^2 = 0.004$) were not significant.

4. Discussion

The present study investigated the effects of MBCT on suicidal ideation in an open-label randomised controlled trial with patients suffering from residual depressive symptoms. A second aim was to examine whether an effect of MBCT on suicidal ideation was dependent on reductions in depression severity, worry and rumination, or an increase in mindfulness. Results revealed that MBCT significantly reduced self-reported suicidal ideation. Whereas in the wait list control-group no significant changes occurred when comparing baseline and post treatment assessments, a significant reduction in suicidal ideation was apparent in the MBCT-group. This interaction effect was independent from the impact of changes in depression, rumination, and mindfulness.

Table 2

Assessment scores of variables used in the analyses, stratified by treatment group.

	Pre assessment						Post assessment					
	MBCT		Control				MBCT		Control			
	M	SD	M	SD	t	p	M	SD	M	SD	t	p
mindfulness	119.98	16.90	121.21	16.27	0.42	0.67	134.80	14.38	124.62	16.54	−3.73	0.00
worry	59.67	10.92	59.70	10.07	0.01	0.99	50.56	11.50	56.29	10.30	2.98	0.00
rumination	42.16	9.73	40.77	9.72	−0.81	0.42	34.38	9.82	37.92	10.00	2.03	0.04
depression	10.27	3.69	10.21	3.55	−0.08	0.93	7.14	4.81	9.68	4.04	3.27	0.00
Suicidal ideation	0.31	0.59	0.20	0.50	−1.21	0.23	0.11	0.36	0.25	0.61	1.54	0.13

MBCT = Mindfulness-based cognitive therapy; CONTROL = waitlist control condition.

Change in worry was a significant covariate of this effect and affected its effect size.

Recent research indicates that suicidal thoughts and behaviour are not merely parts or symptoms of a depressive disorder but represent a nosological entity in their own right [9–12,14,15,17]. This suggests that it cannot be assumed that psychotherapy for depressive disorders will be equally effective in reducing suicidal thoughts and behaviour [19]. Although MBCT is an acknowledged type of intervention for acute and remitted depressive disorders, to date only one study has examined the effect of MBCT on suicidal ideation itself [36]. This study did not find a significant effect of MBCT on suicidal ideation although the effect size was in the hypothesised direction and not negligible ($d = 0.48$). In the present study, with the use of a larger sample size, the effect size in the MBCT group was similar ($d = 0.42$). Moreover, both effect sizes are similar to those effect sizes reported by Tarrier and colleagues [53]. They conducted a meta-analysis of studies examining the effect on suicidality of cognitive-behavioural interventions such as cognitive therapy, problem-solving or dialectic behaviour therapy. In 25 studies they found an overall medium effect size of Hedge's $g = -0.59$ (CI = -0.81 to -0.37).

The results of the present study suggest that in the study by Barnhofer and colleagues [36] a small sample size ($N = 14$ in the treatment group) may have occasioned a type II error. To the best of our knowledge, the present study is the first to suggest that MBCT reduces self-reported suicidal ideation in a large randomised controlled trial with a sample of patients with residual depressive symptoms. Barnhofer and colleagues [36] concluded that suicidal ideation has to be addressed in more detail in order to identify significant changes through MBCT. They suggest the incorporation of a psycho-educational component on the impact of suicidal imagery. This might of course be a reasonable enhancement of MBCT, especially for suicidal patients. Nevertheless, the results of the present study suggest that MBCT in its current form does impact upon suicidal ideation.

Changes in suicidal ideation were independent from changes in depression. This is in line with the meta-analysis by Cuijpers and co-workers [19] who included three studies examining the effect of psychotherapy on suicidal ideation. The authors reported a meta-regression analysis with the

effect size on suicidal ideation as a dependent variable and the effect size on depression as a predictor and found no significant association between both.

Importantly, the present results showed that change in worry over the intervention period diminished the group \times time effect size on suicidal ideation. Thus, the interaction effect can be partly explained by reductions in worrying. This result is in agreement with recent studies reporting that reductions in worry mediate the effect of MBCT on depression [29,30]. Furthermore, it might be interpreted as being in line with the assumption of Kerkhof and van Spijker [54] who claim that repetitive thinking, such as worry, may be a proximal risk factor for suicidal behaviour. According to Watkins [55], repetitive thinking is characterised as uncontrollable, future-orientated, threatening to major personal concerns, and offering neither solution nor relief. Watkins [55] also reported suicidal ideation to be related to worry. Kerkhof and van Spijker [54] argue that, in line with the differential activation hypothesis [56], worrying can trigger chains of dysfunctional suicidal thoughts. In line with Williams and colleagues [32], Kerkhof and van Spijker [54] further assume that therapeutic interventions focusing on, for example, worry postponement or mindfulness may be helpful in reducing suicidal ideation. In the light of these assumptions, the

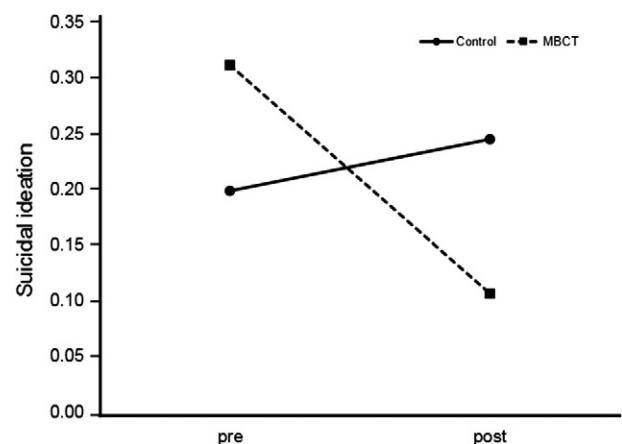


Fig. 1. Interaction effect of study period with treatment group.

present results may be interpreted as indicating that MBCT helps people to distance themselves from worrying cognitions, which in turn may add to a reduction in suicidality.

Van Aalderen and colleagues [29] demonstrated that the effects of MBCT on depression severity were mediated by increases in mindfulness and decreases in rumination. Batink and coworkers [30] replicated the mediating effect of mindfulness but did not find a mediating effect of rumination. The present findings suggest that these variables may play a less important role in the association between MBCT and suicidal ideation. In prior investigations, rumination was associated with suicidal ideation. For example, Krajniak, Miranda and Wheeler [57] found that individuals with a history of suicide attempt reported higher levels of suicidal ideation two years later than individuals without such a history. Rumination was a significant mediator of this association. In a decision tree-based longitudinal risk profiling, Batterham and Christensen [58], examined an Australian population cohort and found that rumination was one of the strongest predictors of suicidal ideation and behaviour after four years. So why was there no significant association between changes in suicidal ideation and rumination in the present investigation? Methodological factors pertaining to the present study may be important. For example, Batterham and Christensen [58] used a different instrument to assess rumination. No information about suicide attempt history was available in the present study, thus precluding examination of the question regarding whether rumination was associated with changes induced by MBCT in the subsample with a history of suicide attempt. It has to be noted that rumination was significantly reduced by MBCT in the present sample (see Table 2) which was not associated with changes in suicidal ideation.

Obviously, a different mechanism of action may have accounted for the observed effects. One potentially important variable is peer support. Mindfulness training was group-based, whereas the waiting list control condition was not. Social isolation is one of the strongest risk factors for suicidal ideation; in contrast, marriage, children, and a greater number of friends are associated with decreased suicide risk [59]. Additionally, according to contemporary theories on the development of suicidal ideation and behaviour – such as the interpersonal theory of suicide [60], or the integrated motivational–volitional model of suicidal behaviour [61] – the absence of reciprocal care is one key component of a sense of thwarted belongingness that may act as a motivational moderator or even as a direct predictor of increases in suicidal ideation. Thus, MBCT delivered in groups may have reduced suicidal ideation by increasing the feeling of social belongingness of the participants. This could mean that any group-based intervention may have resulted in similar effects. However, Tarrier et al. [53] found even larger effects for individual than for group-based cognitive–behavioural treatments. Thus, the medium sized effect of MBCT on suicidality is most likely not reducible to a simple effect of the group-setting that would have been also found in any other therapeutic group.

4.1. Strengths and limitations

Some limitations and strengths of the current RCT should be mentioned. One limitation concerns the absence of an active control group. Moreover, we had no measure of MBCT fidelity with respect to both adherence and competence. The study design does not allow for definite causal inferences. Suicidal ideation was measured with a single item. Despite this being common practice in this area of research [1,2,59] the use of psychometric scales for suicidal ideation would be desirable and may improve the reliability of assessments in future investigations. Strengths include the large sample size and sufficient power for the analysis of group by time interaction effects. Since MBCT was originally developed to prevent depressive relapse, the long-term stability of the results of the present study is of special interest. Therefore, future research may investigate the impact of MBCT on self-reported suicidal ideation across a longer time period.

4.2. Conclusion

In conclusion, the present open-label randomised controlled trial suggests that MBCT may reduce suicidal ideation in patients with residual depressive symptoms. The impact of MBCT on suicidal ideation may be partly mediated by reduction in worry. Our results enlarge the body of knowledge on the effectiveness of MBCT. Future research may investigate the long-term stability of MBCT-related reductions in suicidal ideation and determine whether MBCT also affects acute suicidal ideation in a similar fashion.

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